

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE PROGRAM		
COURSE CODE		SEMESTER	F
COURSE TITLE	DIFFERENTIAL GEOMETRY		
INSTRUCTOR	Charalambos Tsihlias		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	CREDITS	
	6	9	
COURSE TYPE	General knowledge		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	http://www.math.aegean.gr/index.php/en/academics/undergraduate-programs		

(2) LEARNING OUTCOMES

Learning outcomes
<p>The principal aim of the course is the student's introduction to the fundamental notions of the differential geometry of curves and surfaces in R^3. During the course, emphasis is given in the demonstration of these notions by a great variety of examples and exercises.</p> <p>After completing this course, students should demonstrate competency in the following skills:</p> <p>Calculate the curvature and torsion of a curve and identify characteristic curve shapes (flat, helicoid). Identify when a subset is a regular surface. Calculate the first and second fundamental form. Calculate lengths and areas. Calculate, at points of a surface the principal curvatures, Gauss curvature and mean curvature. Recognize elliptic, parabolic, hyperbolic and planar points on a surface.</p>
General Competences
Working independently. Team working. Working in an interdisciplinary environment.

(3) SYLLABUS

Smooth curves in Euclidian space, arc length. Curvature and torsion of a curve. The Frenet frame. The fundamental theorem of local curves theory. Regular surfaces. Coordinate systems and special parameters. Change of coordinates. Differential functions. The tangent plane, differential of a map. The first fundamental form. Orientation. Gauss map and shape operator. The second fundamental form. Gauss curvature and mean curvature. Isometries. Christoffel symbols and Gauss's theorem Egregium. Geodesics of a surface.	
TEACHING MATERIAL DISTRIBUTION	The teaching material of the course is uniformly distributed during the semester.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Communication with students via e-mail	
TEACHING METHODS	Activity	Semester workload
	Lectures	52
	Tutorials	26
	Independent study	147
	Course total (25 per ECTS)	225
COURSE COMMITMENTS	Attending course and tutorial sessions is not obligatory.	
STUDENT PERFORMANCE EVALUATION	Student's evaluation is done in Greek through a written examination which includes short-answers questions and problem solving. For students with disabilities, evaluation takes place via oral exams.	

(5) ATTACHED BIBLIOGRAPHY

1. Barrett O'Neill. Elementary Differential Geometry. Academic Press Inc, 1966.
2. Pressley Andrew. Elementary Differential Geometry, 2nd Edition. Springer-Verlag, 2010.
3. Παπαντωνίου Βασίλειος. Διαφορική Γεωμετρία. Εκδόσεις Πανεπιστημίου Πατρών, 2016.
4. Κουτροφιώτης Δημήτρης. Στοιχειώδης Διαφορική Γεωμετρία. Leader Books, 2005.